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The structure of the proton and the combination of fundamental forces

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Abstract
This publication deals with the structure of the proton and the three fundamental forces: strong force, electromagnetic force and gravitational force. It can be shown that these fundamental forces have an electromagnetic origin.

Keywords: Proton structure, fundamental forces, gravitation, strong force, Lorentz force

1. Introduction

It has been proven that the gravitational force is a resultant electromagnetic force, comparable to the Lorentz force [1.]. This results from the expansion of the universe and all objects with their atoms in it. Assuming the existence of the same number of magnetic charges as electric charges in the atoms, the gravitational force between two masses was derived using Maxwell's equations and a resulting Lorentz force. ***This inevitably leads to the existence of magnetic monopoles in the atoms. The only possibility is that the magnetic elementary charges are located in the protons of the atoms.***

2. The proton structure

According to these new findings, the proton consists of 3 elements: A magnetic north pole, a magnetic south pole and a positron. What are the consequences of this structure and how can it be proven?

The previous description of the proton with quarks and gluons could be wrong. My own earlier assumption that a magnetic north pole and a magnetic south pole can form an electron neutrino is also hereby rejected.

The positron would provide the positive electrical charge of the proton. For example, a special exotic hydrogen is also known as positronium, whose nucleus contains a positron rather than a proton. Due to the absence of the proton, positronium is much lighter than normal hydrogen and is also electrically neutral to the outside.

The atomic structure of matter in the universe would be extraordinarily symmetrical and beautiful. ***There would not only be the same number of positive and negative electric elementary charges, but also the same number of magnetic north and magnetic south poles in the universe. The total number of electric and magnetic elementary charges would be identical. With positron, electron, north pole and south pole, there are 4 fundamental elements for the simplest and most common hydrogen atom in the universe, of which 2 are electric and 2 are magnetic elementary charges. If the magnetic south pole is still the antiparticle of the magnetic north pole, i.e. an anti-north pole, the same number of material and antimaterial elementary particles exist.***

In the publication [1.], both the number of electric charges N as well as the number of magnetic charges N in the masses was calculated using the simple relationship $N = m/(m_p + m_e)$ was calculated. This was one of the conditions for the correct gravitational force calculation. From this it is concluded for the number of magnetic poles that the following applies: $N = m/(m_{NP} + m_{SP})$. Since both poles are components of the

proton, this is easily possible. The north pole m_{NP} and the south pole m_{SP} should have the same mass: $m_{NP} = m_{SP}$. How can it be explained that the north poles and their possible antiparticles do not annihilate the south poles (antinorth poles)? It was shown in my earlier publications [2.] that magnetic monopoles could be involved in time formation. The anti-north pole could play a special role in connection with the positron. It is probably not possible for both magnetic poles to meet in one place at the same time. By natural law, they would presumably have a minimal temporal distance. The sources and sinks of the magnetic elementary charges are located in the masses and form time.

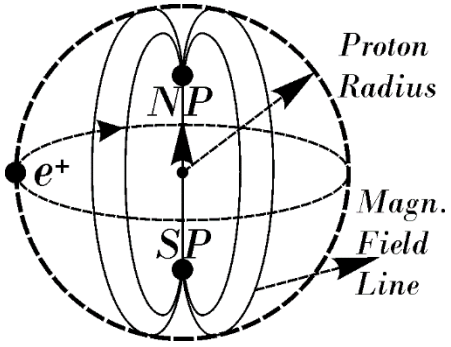

Figure 1: *Model of the proton, consisting of north pole NP, south pole SP and positron e+*

Why don't the electron and the positron annihilate? The electric positron is shielded and kept away from the electron by binding to magnetic monopoles in the proton. However, with the help of the tunnel effect, it is theoretically possible for electron and positron annihilation to take place.

Maxwell's equations would become completely symmetrical with the two magnetic elementary charges, which then represent the sources and sinks of magnetic fields.

An important observation gap could be closed. Dirac already suspected that magnetic elementary charges must exist in nature, but they have not yet been discovered.

This could explain the great stability of the proton and also its magnetic moment.

The fact that a proton basically consists of 3 elements is supported by observation. It should be mentioned here that different combinations of the 3 elements lead to various elementary particles. These must now be explained anew with reference to the newly discovered 3 elements of the proton. This concerns their structure and their interactions. Today it is assumed that certain elementary particles are composed of quarks and thus of thirds of an elementary charge. This contradicts the observation of integer charges and should be rejected. Magnetic charges in interaction with the positron and the acting Lorentz force could create the false impression that they are electric charges in certain parts that are smaller than an elementary charge.

If, for example, an object is attracted by another object made of permanent magnet material, it is not obvious from the external effect which of the two interacting objects is a magnet, whether both objects are magnets or whether both objects have a different electrostatic charge.

3. The forces within the proton and the formation of time

The forces acting within the proton are now to be investigated. These forces ensure the cohesion of the proton. The Lorentz force between the north pole and the positron and the south pole and the positron could be greater than the magnetic force between the north and south poles by the ratio strong force/magnetic force. Then the strong force would simply be the resulting Lorentz force that occurs in the constellation of charges and their relative movements in the proton. This force also acts beyond the boundaries of the proton and ensures that the protons are held together.

The following attractive magnetic force acts at a distance r between the north and south poles:

$$F_{mg} = \frac{p^2}{4\pi\,\mu_0\,r^2} \qquad (01)$$

This relationship is comparable to that for the force between two electrical charges, for example the proton and the electron:

$$F_{el} = \frac{e^2}{4\pi\,\varepsilon_0 r^2} \qquad (02)$$

The distance r according to equation (01) in the proton has the order of magnitude of the proton radius r_p. In the following considerations, it is assumed that the two magnetic poles and each magnetic pole have the same distance from the electric pole. One can imagine an equilateral triangle in which two corners each have a magnetic pole and one corner has the positron (see Figure 1).

The magnetic force according to equation (01) is $F_{mg} = 3.260\,10^2\,N$ with the proton radius $r_p = 8.412\,10^{-16}\,m$ as the distance and the magnetic elementary charge $p = 6.036\,10^{-17}\,Vs$.

The electric positron is shielded and kept away from the electron by binding to magnetic monopoles in the proton. The known Lorentz force, which acts on a moving electric charge $\vec{Q}_{el}$ which moves with the speed $\vec{v}$ in an electromagnetic field is calculated as follows:

$$\vec{F}_{Lorentz} = \vec{Q}_{el}\vec{E} + \vec{Q}_{el}\left(\vec{v} \times \vec{B}_{mg}\right) \qquad (03)$$

If there is no external electric field of field strength $\vec{E}$, equation (03) is simplified and the resulting force $\vec{F}_{res}$ acts on the electric charge $\vec{Q}_{el}$:

$$\vec{F}_{res} = \vec{Q}_{el}\left(\vec{v} \times \vec{B}_{mg}\right) \qquad (04)$$

If the speed of the electric charge $\vec{Q}_{el}$ is perpendicular to the field lines of the magnetic field with the flux density $\vec{B}_{mg}$, equation (04) can be further simplified by omitting the cross product:

$$\vec{F}_{res} = \vec{Q}_{el}\,\vec{v}\,\vec{B}_{mg} \qquad (05)$$

In the magnetic field with flux density $\vec{B}$, which emanates from one of the two magnetic monopoles, the resulting force $\vec{F}_{res}$ acts on the positron, which moves with velocity $\vec{v}$.

The charge of the positron corresponds to the electric elementary charge:

$$\vec{Q}_{el} = e \qquad (06)$$

The speed $\vec{v}_{po}$ of the positron could correspond approximately to the speed of light. The speed is perpendicular to the magnetic field axis between the north and south poles. It is the limiting speed for particles with mass, which the positron almost reaches.

$$\vec{v}_{po} = c \qquad (07)$$

At 99.99% of the speed of light, the positron is around 71 times heavier than at rest. The relativistic mass of the positron could therefore contribute a significant proportion to the proton mass. The positron mass will be examined in more detail below. The electron, which is much further out in the hydrogen atom, has a speed compared to the positron that is about $1/137$ of the speed of light.

The positron has this speed in relation to the two magnetic charges. The arrangement of the north pole and south pole can be understood as a dipole, the poles of which have a certain spatial (and temporal) distance to each other.

The orbital radius of the positron, which is located in the center of the north pole-south pole axis and is perpendicular to it, is slightly smaller than the distance between the north and south poles. The orbital radius of the positron and the proton radius could be approximately the same (Figure 1).

This constellation of the proton structure is promising. The uncertainty of the electron's location in the hydrogen atom can be explained. The electron is attracted by the proton and briefly annihilated with its positron. ***The fuzziness of the electron's location in the hydrogen atom can be explained by the formation of time. This means that both the location of the electron at a certain point in time and its momentum, whose speed is determined by time, become blurred.***

The electron is attracted by the positron in the proton and could annihilate with it. It is possible that an annihilation and new formation process of electron and positron takes place.

The velocity $\vec{v}$ of the positron is given by equation (07) with $2.998\ 10^8\ m/s$.

The magnetic flux density $\vec{B}$ in equation (05) results from the magnetic field strength. For a point magnetic charge in space, the following applies to the magnetic field strength at a distance r:

$$\vec{H} = \frac{\vec{Q}_{mg}}{4\pi\mu_0\ r^2} \tag{08}$$

This results in the magnetic flux density $\vec{B}_2$ with the absolute permeability μ and the magnetic elementary charge p:

$$\vec{B} = \mu\vec{H} = \mu_0\mu_r\vec{H} = \mu_0\mu_r\frac{p}{4\pi\mu_0\ {r_p}^2} = \mu_r\frac{p}{4\pi\ {r_p}^2} \tag{09}$$

The material-dependent permeability μ_r within the proton is the ratio of the Klitzing resistance R_{kl} and the vacuum characteristic impedance Z_0:

$$\mu_r = \frac{R_{kl}}{Z_0} \tag{10}$$

In my publication [1.], not only the enlargement of the atoms was investigated, but also the enlargement of the protons in chapter 5. However, in contrast to equation (10), a different substance-dependent permeability μ_r was assumed in the proton.

The magnetic flux density $\vec{B}$ according to equation (09) is then $\vec{B} = 5.401\ 10^{18}\ Vs/m^2$.

The resulting electromagnetic Lorentz force on the positron according to equation (05) in the magnetic field with the flux density $\vec{B}$ can then be written as follows:

$$\vec{F}_{res} = \vec{Q}_{el}\ \vec{v}\ \vec{B} = \frac{epc}{4\pi\ {r_p}^2}\ \frac{R_{kl}}{Z_0} \tag{11}$$

The context already published by me [1.] applies here:

$$\frac{R_{kl}}{Z_0} = \frac{1}{2\alpha} \tag{12}$$

This allows the equation (11) to be simplified and the force to be calculated:

$$\vec{F}_{res} = \frac{epc}{8\pi\alpha\ {r_p}^2} = \frac{R_{kl}}{Z_0}F_{mg} = \mu_r F_{mg} = 2.234\ 10^4\ N \tag{13}$$

This means that the electromagnetic Lorentz force according to equation (13) is 68.5 times greater as a strong force than the magnetic force according to equation (01). This assumption mentioned above is confirmed.

The gluon model is hereby falsified. ***It is remarkable that with the permeability in the proton, which differs from that in a vacuum, and the speed of the positron, which almost corresponds to the speed of light, the Lorentz force is greater by exactly the permeability in the proton than the comparable magnetic force in a vacuum.***

The theoretical annihilation process of the positron with the electron will now be examined. The oscillation period of the positron is of particular importance here. When the positron is annihilated, a photon with the radiation energy E_{po} of the frequency f_{po} is produced. The photon of the annihilated electron moves in the opposite direction with the same frequency. The following applies to the positron:

The assumed annihilation process of the positron with the electron will now be investigated. The oscillation period of the positron is of particular importance here. When the positron is annihilated, its total energy becomes radiant energy of frequency f_{po}. The following applies:

$$E_{po} = \frac{m_{po0}}{\sqrt{1-\frac{v_{po}^2}{c^2}}}c^2 = \frac{m_e}{\sqrt{1-\frac{v_{po}^2}{c^2}}}c^2 = m_{po}c^2 = hf_{po} \qquad (14)$$

As it is assumed that the positron moves at approximately the speed of light on the circumference of the proton, the oscillation frequency corresponds to f_{po} corresponds to the comparable photon frequency of the annihilation radiation.

The rest mass m_{po0} of the positron corresponds, as is well known, to the electron mass m_e. The period of oscillation T_{po} results with the proton radius r_p as follows:

$$T_{po} = \frac{2\pi r_p}{c} = 1.763\ 10^{-23} s \quad t_{po} = \frac{r_p}{c} \qquad f_{po} = \frac{1}{T_{po}} = 5.672\ 10^{22}\ Hz \qquad (15)$$

A tiny error is accepted here, as the speed must be slightly less than the speed of light.

The period T_{po} is very small and could in principle be used for a super-precise atomic clock. This period is a quantized time span with which each proton ticks, so to speak. If we divide the age of the universe by the reduced time span t_{po} of each proton according to (15), we arrive at a number N_{tpo} that remains constant with the age of the universe, because each period grows proportionally with this age (see equation (44)).

$$N_{tpo} = \frac{t_{uni}}{t_{po}} = \frac{4.352\ 10^{17}\ s}{2.806\ 10^{-24}\ s} = 1.551\ 10^{41} \qquad (16)$$

This number of reduced time spans N_{tpo} can be expressed by other concise correlations:

1. with the help of the mass of the universe m_{uni} and the electron mass m_e:

$$N_{tpo} = \frac{t_{uni}}{t_{po}} = \sqrt{\frac{m_{uni}}{8\ m_e}} \qquad (17)$$

2. with the help of the radius of the universe $r_{uni} = c\ t_{uni}$ and the proton radius r_p:

$$N_{tpo} = \frac{t_{uni}}{t_{po}} = \frac{r_{uni}}{r_p} \qquad (18)$$

3. with the help of the gravitational value G, the electron mass m_e and the proton mass m_p:

$$N_{tpo} = \frac{t_{uni}}{t_{po}} = \frac{\hbar\ c}{2\ G\ m_e\ m_p} \qquad (19).$$

The quantized time span T_{po} can be used to justify the creation of a time quantity. It is known that an antiparticle can be understood as a particle that moves backwards in time. Although this statement is correct, it is, strictly speaking, incomplete. It does not shed light on a very important fact, which is stated here for the first time. Time is required (consumed) for any movement of particles.

If an antiparticle moves backwards in time, time must therefore be created. Time is created during the movement of the positron and the anti-north pole in the proton. Every atom functions as a small time generator. Every oscillation of a positron in the proton releases a period T_{po}.

In earlier publications, I have already pointed out the necessity of the creation of time from matter [2.]. At that time, I assumed that it is released when neutrinos are magnified. This is hereby falsified, because time is created by the positron and the anti-north pole during the structural change and the enlargement of protons. The formation of time can be described as one-dimensional radiation. However, the one-dimensional emitters are not located in the neutrinos, but in the protons. Time radiation is electromagnetic temperature radiation. Therefore, the positron as an electric antiparticle and the anti-north pole as a magnetic antiparticle are involved in the formation of time. The change in the flow of time on one mass in the presence of another mass can in turn be used to calculate gravitation [3.] Gravitation inhibits the formation of time in the protons, which can be proven by the slowed flow of time in the region of large masses. During the expansion of the universe, space and time are created from the masses. ***The space-time erasure associated with gravitation leads to the observed deflection of light in the region of heavy masses.***

Equations (14) and (15) can be used to determine the relativistic mass of the positron m_{po}:

$$m_{po} = \frac{h}{T_{po}\, c^2} = \frac{h}{2\pi t_{po}\, c^2} = \frac{\hbar}{t_{po}\, c^2} = \frac{\hbar}{\boldsymbol{r_p\, c}} = 4.182\ 10^{-28}\ kg \qquad (20)$$

This relativistic mass m_{po} is much higher than the rest mass m_{po0} of the positron. ***This is the first time the following relationship occurs. The proton mass m_p is exactly 4 times as large as the positron mass m_{po}.***

$$m_p = 4\, m_{po} \qquad (21)$$

Equation (65) from [1.] can be used to confirm the concise relationship according to (20):

$$\frac{r_p m_p c}{\hbar} = 4 = \frac{m_p}{m_{po}} \qquad \frac{r_p c}{\hbar} = \frac{1}{m_{po}} \qquad m_{po} = \frac{\hbar}{r_p c} \qquad (22)$$

With the mass, it is now possible to calculate the positron speed in the proton. The determined speed of the positron is very close to the speed of light. From equation (14) follows:

$$v_{po} = c\sqrt{1 - \frac{{m_{po0}}^2}{{m_{po}}^2}} = 0{,}9999976\ c \qquad (23)$$

Due to the various symmetries (see also point 6.), it is likely that the rest masses of the two monopoles in the proton correspond to those of the electron and positron. They could have the same velocity v_{po} in the proton as the positron and would then also have the same relativistic mass. This would occupy 3 quarters of the proton mass and the last quarter would be the mass equivalent of the binding energy.

If it were possible to utilize the energy of the annihilation process with hydrogen, the electron could be accelerated to the speed of the positron to activate it. This would require the following activation energy:

$$E_{akt} = m_{po}c^2 - \frac{m_e}{\sqrt{1-\frac{(\alpha c)^2}{c^2}}}c^2 = m_{po}c^2 - \frac{m_e}{\sqrt{1-\alpha^2}}c^2 = \left(\frac{m_p}{4} - \frac{m_e}{\sqrt{1-\alpha^2}}\right)c^2 \qquad (24)$$

$$E_{akt} = 3.750\ 10^{-11}\ Ws$$

The annihilation process of a positron and an electron with the same velocity then leads to the following net useful energy E_use when the activation energy is taken into account:

$$E_{use} = E_{po} + E_e - E_{akt} = 2\, m_{po}c^2 - \left(\frac{m_p}{4} - \frac{m_e}{\sqrt{1-\alpha^2}}\right)c^2 = \left(\frac{m_p}{2} - \frac{m_p}{4} + \frac{m_e}{\sqrt{1-\alpha^2}}\right)c^2 \qquad (25)$$

$$E_{use} = \left(\frac{m_p}{4} + \frac{m_e}{\sqrt{1-\alpha^2}}\right)c^2 = 3.766\ 10^{-11}\ Ws \qquad (26)$$

Not even half of the total annihilation energy would be needed to activate the annihilation process. One gram of hydrogen has a total number of about $1.2\ 10^{24}$ electrons and positrons. According to equation (26), this would lead to a useful energy of $4.5\ 10^{13}$ Ws in the case of complete annihilation. If this energy were to

be released in one hour, the power would be $4.5\ 10^{13}\ W = 45\ TW$. This corresponds to the output of 12.5 nuclear power plants. In order to realize a technically usable energy output without overheating, the annihilation process would have to be extremely slow. The use of annihilation energy is not considered feasible today because it is extremely energy-intensive to produce antimatter and it is very difficult to store it. Now it turns out that it is everywhere and safely locked up in the proton.

4. Summary of the three fundamental forces investigated

- ***The strong force is a Lorentz force that occurs between the two magnetic poles and the positron in the proton due to the electromagnetic effect. $\mu_r = R_{kl}/Z_0$ is***
- ***The electric force occurs between electric charges and the magnetic force between magnetic charges.***
- ***The gravitational force is a Lorentz force that occurs as a result of the expansion of the universe and all the atoms and electrical charges it contains due to the resulting electrical displacement current of one mass in the magnetic field of the magnetic charges of the other mass.***

The known force ratios of the fundamental forces and their interaction constants are exactly achieved with these findings. The three fundamental forces investigated are of electromagnetic origin.

5. The dynamics of change in the expansion of the universe and other connections

The electromagnetic derivation of gravitation only became possible with the realization that all atoms increase in size with the expansion of the universe [1.]. In addition to the geometric quantities, however, various other physical quantities also change, such as masses, periods, temperatures, etc. [4.]. A brief overview is provided here.

Other important physical relationships are also revealed in this chapter.

The entropy of the universe S_{uni} remains constant, as its edge expands at the speed of light and no mass or energy can escape. It is an adiabatic system.

The entropy of the universe is given by the Boltzmann constant k_B and the reduced Planck constant $\hbar$:

$$S_{uni} = \frac{k_B}{\hbar} m_{uni}\, t_{uni}\, c^2 = 8.997\ 10^{98}\, \frac{J}{K} = const. \tag{27}$$

A constant number of very small effects can be derived from this:

$$N_{uni} = \frac{m_{uni}\, t_{uni}\, c^2}{\hbar} = \frac{S_{uni}}{k_B} = 6.5\ 10^{121} \tag{28}$$

The number of effects also results from the masses of the universe m_{uni}, the electron m_e and the proton m_p:

$$N_{uni} = \sqrt{\frac{2\, {m_{uni}}^3}{m_e\, {m_p}^2}} \tag{29}$$

Another way of writing equation (28) includes the age of the universe:

$$N_{uni} = \frac{c^6\, {t_{uni}}^3\, m_e\, {m_p}^2}{2\, \hbar^3} \tag{30}$$

Equation (30) also shows very nicely that the masses of electron and proton must change.

The number of effects can also be written using certain physical quantities from the Planck unit system:

$$N_{uni} = \frac{{m_{uni}}^2}{{m_{Planck}}^2} = \frac{{t_{uni}}^2}{{t_{Planck}}^2} = \frac{{r_{uni}}^2}{{r_{Planck}}^2} \tag{31}$$

$$N_{uni} = \frac{m_{uni}}{m_{Planck}} \frac{t_{uni}}{t_{Planck}} = \frac{S_{uni}}{S_{Planck}} \tag{32}$$

It is likely that the universe is not only expanding adiabatically, but that it is an isentropic circular process. The substances of isentropic processes have an isentropic exponent. In the universe, the so-called ether is the substance that undergoes the changes of state. It is known that as the universe expands, the temperature decreases with the third power of the increase in volume.

$$\mathcal{T}_{uni}{}^{3}\, V_{uni} = const. \qquad \mathcal{T}_{uni}{}^{3} r_{uni}{}^{3} = const. \qquad \mathcal{T}_{uni}\, r_{uni} = const. \quad (33)$$

For isentropic processes, the following relationship between temperature and volume also applies:

$$\mathcal{T}_{uni}\, V_{uni}{}^{\kappa-1} = const. \qquad \mathcal{T}_{uni}\, r_{uni}{}^{3(\kappa-1)} = const. \quad (34)$$

Equations (33) and (34) can now be simply written:

$3(\kappa - 1) = 1$ From this follows for the ether of the universe: $\boldsymbol{\kappa = \frac{4}{3}}$ (35)

All masses m_x change with the mass m_{uni} and the age of the universe t_{uni}. The product of mass and age remains constant, as equation (24) shows:

$$m_{uni}\, t_{uni} = m_{uni\,new}\, t_{uni\,new} \qquad m_x\, t_{uni} = m_{x\,new}\, t_{uni\,new} \quad (36)$$

$$m_{x\,new} = \frac{m_x\, t_{uni}}{t_{uni\,new}} \quad (37)$$

Any future period of time can be specified Δt in relation to the current age t_{uni} of the universe:

$$\Delta t = t_{uni\,new} - t_{uni} \quad (38)$$

Equation (37) can be rewritten as (38):

$$m_{x\,new} = \frac{m_x\, t_{uni}}{t_{uni}+\Delta t} \qquad m_{x\,new} = \frac{m_x}{1+\frac{\Delta t}{t_{uni}}} \quad (39)$$

The changes of energy (E_x) frequency (f_x) and temperature ($\mathcal{T}_x$) must be proportional to the mass changes:

$$E_{x\,new} = \frac{E_x}{1+\frac{\Delta t}{t_{uni}}} \qquad f_{x\,new} = \frac{f_x}{1+\frac{\Delta t}{t_{uni}}} \qquad \mathcal{T}_{x\,new} = \frac{\mathcal{T}_x}{1+\frac{\Delta t}{t_{uni}}} \quad (40)$$

All distances s_x change as follows with the age of the universe:

$$\frac{r_{uni}}{t_{uni}} = \frac{r_{uni\,new}}{t_{uni\,new}} = c \qquad \frac{s_x}{t_{uni}} = \frac{s_{x\,new}}{t_{uni\,new}} \qquad s_{x\,new} = s_x \frac{t_{uni\,new}}{t_{uni}} \quad (41)$$

$$s_{x\,new} = s_x \frac{t_{uni}+\Delta t}{t_{uni}} \qquad s_{x\,new} = s_x \left(1 + \frac{\Delta t}{t_{uni}}\right) \quad (42)$$

The distances that change naturally also include the Bohr radius and the proton and electron radii.

The following interesting relationship applies to the proton radius with the electric and magnetic elementary charge e and p and the fine structure constant α which is published here for the first time:

$$r_p m_p c\, \pi\, \alpha = ep \quad (43)$$

For the proton radius r_p is related to the age of the universe as follows t_{uni}:

$$r_p = \frac{2\, t_{uni}\, G\, m_e m_p}{\hbar} \quad (44)$$

The next equation, which can be obtained using (17), shows a further relationship for calculating the proton radius r_p:

$$r_p = 2\sqrt{\frac{2\, t_{uni}\, G\, m_e}{c}} \quad (45)$$

Equation (22) and equation (53) from [1.] can be used to calculate the Planck constant with the relativistic positron mass m_{po}. The interaction constants α_{strong} of the strong and gravitational force α_{grav} and the age of the universe t_{uni} are included here. This is further proof of the mathematical connection between macroscopic physics and quantum physics.

$$\hbar = \frac{\alpha_{grav}}{\alpha_{strong}}\, m_{po}\, t_{uni}\, c^2 \tag{46}$$

For the electron radius r_e a formula was given for the first time in [4.], which also contains the age of the universe t_{uni} and also shows that this radius cannot remain constant:

$$r_e = \frac{2\, t_{uni}\, G\, {m_e}^2}{\hbar} = \frac{m_e\, r_p}{m_p} \tag{47}$$

For the change in all periods with the age of the universe t_{uni} applies:

$$T_{x\,new} = T_x \left(1 + \frac{\Delta t}{t_{uni}}\right) \tag{48}$$

Areas A_x therefore change with the square of distances s_x:

$$A_{x\,new} = A_x \left(1 + \frac{\Delta t}{t_{uni}}\right)^2 \tag{49}$$

Volumes V_x therefore change with the third power of distances s_x:

$$V_{x\,new} = V_x \left(1 + \frac{\Delta t}{t_{uni}}\right)^3 \tag{50}$$

Forces F_x and performances P_x must change as follows due to the changes in energy, distance and time:

$$F_{x\,new} = \frac{F_x}{\left(1+\frac{\Delta t}{t_{uni}}\right)^2} \qquad P_{x\,new} = \frac{P_x}{\left(1+\frac{\Delta t}{t_{uni}}\right)^2} \tag{51}$$

The gravitational force must therefore also decrease quadratically with the age of the universe. ***No dark energy is required for expansion; the gravitational force decreases with the age of the universe.*** The gravitational force becomes smaller because the masses become smaller and the distances become larger. What happens to the Newtonian gravitational value G ?

It also changes with the age of the universe. The ratios of the fundamental forces must remain constant. This also applies to the ratio of the gravitational force to the electric force:

$$\frac{F_{grav}}{F_{el}} = \frac{\frac{G\, m_e m_p}{{r_{bohr}}^2}}{\frac{e^2}{4\pi\, \varepsilon_0 {r_{bohr}}^2}} = \frac{G\, m_e m_p}{\frac{e^2}{4\pi\, \varepsilon_0}} = const. \tag{52}$$

The elementary charge e and the electric field constant ε_0 are real natural constants. ***Since both the electron mass and the proton mass decrease with the age of the universe, the G must increase quadratically:***

$$G\, m_e m_p = G_{new}\, m_{e\,new} m_{p\,new} = G_{new} \frac{m_e}{1+\frac{\Delta t}{t_{uni}}} \frac{m_p}{1+\frac{\Delta t}{t_{uni}}} \tag{53}$$

$$G_{new} = G \left(1 + \frac{\Delta t}{t_{uni}}\right)^2 \tag{54}$$

As a verifiable cosmological example, the annual increase in the distance between the Earth and the Moon can be precisely calculated using the variable variables of orbital radius, mass and gravitational value [5.].

Various electrical and magnetic quantities naturally also change with the expansion of the universe. These include the electric and magnetic field strength, which must change like forces:

$$E_{el\,new} = \frac{E_{el\,x}}{\left(1+\frac{\Delta t}{t_{uni}}\right)^2} \qquad H_{mg\,new} = \frac{H_{mg\,x}}{\left(1+\frac{\Delta t}{t_{uni}}\right)^2} \tag{55}$$

The electric and magnetic flux density also change like forces:

$$D_{el\,new} = \frac{D_{el\,x}}{\left(1+\frac{\Delta t}{t_{uni}}\right)^2} \qquad B_{mg\,new} = \frac{B_{mg\,x}}{\left(1+\frac{\Delta t}{t_{uni}}\right)^2} \tag{56}$$

All voltages and currents must change like energies:

$$U_{new} = \frac{U_x}{1+\frac{\Delta t}{t_{uni}}} \qquad I_{new} = \frac{I_x}{1+\frac{\Delta t}{t_{uni}}} \tag{57}$$

For capacitances and inductances, the following applies in inverse proportion to voltages and currents:

$$C_{neu} = C_x\left(1+\frac{\Delta t}{t_{uni}}\right) \qquad L_{neu} = L_x\left(1+\frac{\Delta t}{t_{uni}}\right) \tag{58}$$

Of course, there are also real natural constants. These include the quantities: Quantum of action $\hbar$, speed of light c, Boltzmann constant k_B, electric and magnetic elementary charge e and p, permittivity ε, permeability μ, and the fine structure constant α.

With the age of the universe, velocities v_x and resistances R_x also remain constant. While momentum p_x decreases with mass, angular momentum L_x remains constant.

Equations (33) to (54) can be used to derive the changes in all other physical quantities.

6. Results and summary

The structure of the proton from three fundamental elements was described, from which a charge-symmetrical world follows. The three fundamental forces: strong force, electromagnetic force, gravitational force could be uniformly justified electromagnetically. The dynamics of change of the universe, which follows from the progression of its age, was described.

The conclusions of the described proton structure will be summarized:

- *The relationship between strong and electromagnetic force in the proton can be explained.*
- *The strong force, electromagnetic force and gravitational force have a common electromagnetic origin and can be explained using Maxwell's equations.*
- *The suspected magnetic monopoles were found.*
- *The origin of time from the antimatter charges of protons can be explained.*
- *The uncertainty of the electron's position and momentum can be explained.*
- *A positive and a negative electric charge exist in the hydrogen atom.*
- *There is a magnetic north pole charge and a south pole charge in the hydrogen atom.*
- *There are two electric and two magnetic charges in the hydrogen atom.*
- *There are two material and two antimaterial charges in the hydrogen atom.*
- *The same number of positive and negative charges exist in the universe.*
- *The same number of magnetic north and south poles exist in the universe.*
- *The same number of electric and magnetic charges exist in the universe.*
- *There are the same number of material and antimaterial charges in the universe.*

The unique structure of the proton and the resulting perfect symmetry of the hydrogen atom and the universe are undoubtedly one of the greatest wonders of nature.

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